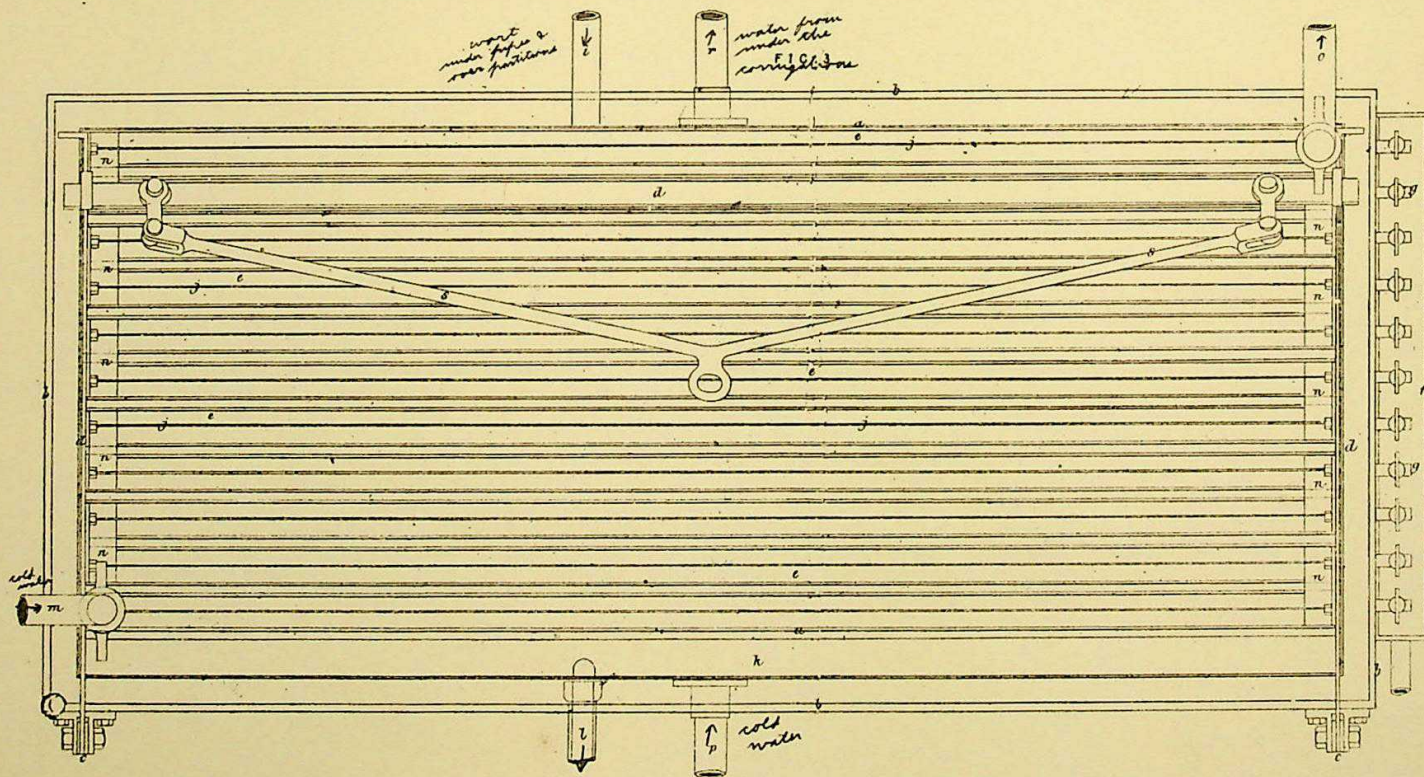
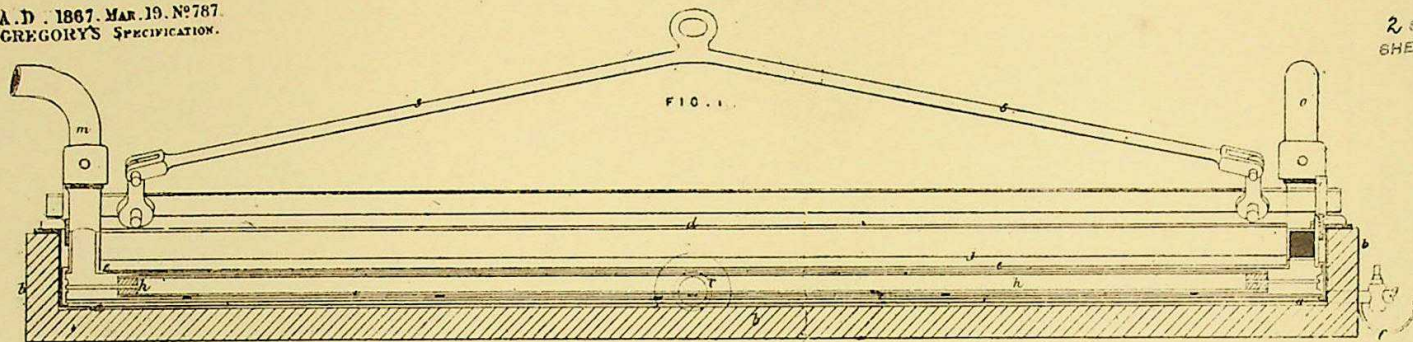


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GREGORY'S SPECIFICATION.

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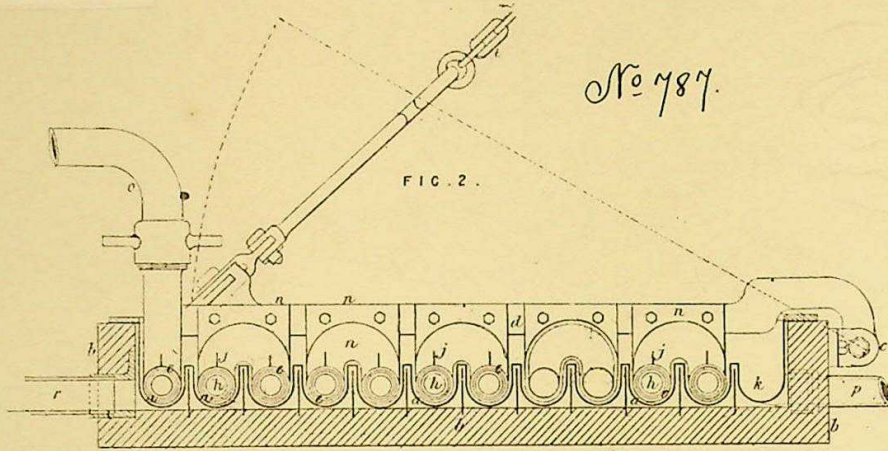


FIG. 2.

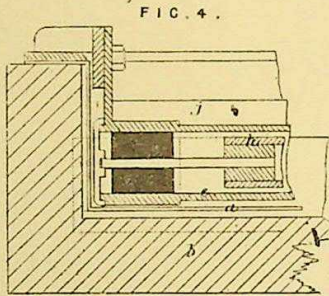


FIG. 4.

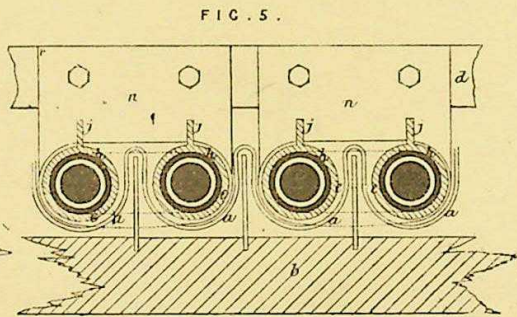


FIG. 5.

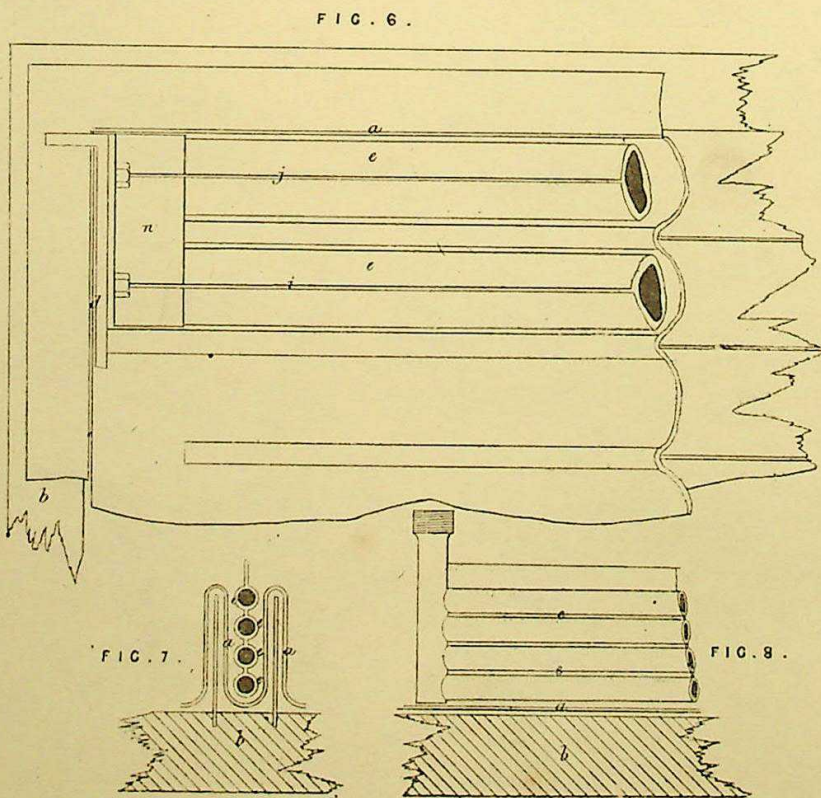


FIG. 6.

FIG. 7.

FIG. 8.

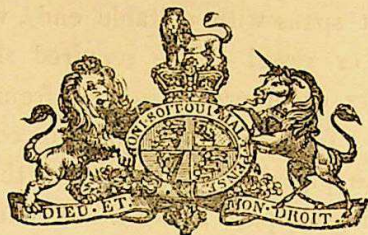
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Beer Coolers  
62. REFRIGERATION,  
Beer-Coolers.

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A.D. 1867, 19th MARCH. N° 787.

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### Refrigerating Apparatus.

LETTERS PATENT to Francis Gregory, of the Firm of Gregory and Haynes, of Salford, in the County of Lancaster, Brewery Machinists, for the Invention of "IMPROVEMENTS IN MACHINERY OR APPARATUS FOR REFRIGERATING PURPOSES USED IN BREWERIES AND DISTILLERIES."

Sealed the 17th September 1867, and dated the 19th March 1867.

PROVISIONAL SPECIFICATION left by the said Francis Gregory at the Office of the Commissioners of Patents, with his Petition, on the 19th March 1867.

I, FRANCIS GREGORY, of the Firm of Gregory and Haynes, of Salford, in the County of Lancaster, Brewery Machinists, do hereby declare the nature of the said Invention for "IMPROVEMENTS IN MACHINERY OR APPARATUS FOR REFRIGERATING PURPOSES USED IN BREWERIES AND DISTILLERIES, to be as follows:—

This Invention relates to the cooling or regulating the temperature of the wort liquors in the process of brewing or for other purposes; and in the first



*Gregory's Improvements in Refrigerating Apparatus.*

place consists in employing a series of hollow troughs framed or formed of corrugated metal in the shape of continuous external and internal arches of the same or of different spans with suitable ends, which series of troughs I place in a framework or vessel of the required shape and dimensions, to which I attach, by hinges or otherwise, another framework which supports a number of pipes or tubes of any required shape or configuration with suitable connections, so that the pipes or tubes fit into the hollow troughs of the corrugated metal, allowing a space between the concavities of the corrugated metal and pipe or pipes. At one side or end of the framework or vessel I place a channel or trough which is connected with suitable openings with the bottom of the trough in the corrugated metal. At the ends of the openings in the trough or channel I place a number of valves attached to a shaft, each of which is acted upon separately by a spring, the arrangement being such that all can be opened and shut by one operation. In the tubes or pipes I place one or more pipes or tubes of any required configuration with one or both ends closed or partially closed, or timber or any solid or hollow material may be used for the same purpose. At each end of the vessel or framework I place a worm and wheel arranged with suitable mechanical contrivance to raise or lower the framework (to which is attached the tubes) from or to the corrugated metal, or by the plan described by me in the Specification of the Letters Patent dated 29th April 1865, No. 1204. I introduce the worts to be cooled on the surface of the corrugated metal, the worts being directed by strips or projections along the top of the exterior pipes or tubes into the space round the concave surfaces of the corrugated metal and the pipes or tubes, and over the external arches, and so on until conveyed to where required, sufficient inclination being given to cause them to flow with freedom. At the other end from where I introduce the worts cold water or other liquid is admitted which passes in the space between the interior and exterior tubes or pipes running in an opposite direction to that of the hot wort, gradually reducing it to the temperature required. The interior pipes, tubes, or other material causes the water to flow in a thin stream.

Another part of this Invention consists in passing a stream of cold water under the corrugated metal with suitable divisions to cause it to flow up and down, following the course of the corrugated metal in a thin stream until it passes out at the same end where the hot wort is admitted; either one or other of the streams can be used separately or conjointly as desired. I sometimes pass the hot worts through the pipes instead of the plan described. I use it also without the interior tubes or other material named, and two



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*Gregory's Improvements in Refrigerating Apparatus.*

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or more tubes may be placed in each trough of the corrugated metal if desired.

It is evident that the various modifications of this apparatus can be used for distilleries as well as breweries.

5 **SPECIFICATION** in pursuance of the conditions of the Letters Patent, filed by the said Francis Gregory in the Great Seal Patent Office on the 19th September 1867.

**TO ALL TO WHOM THESE PRESENTS SHALL COME, I, FRANCIS GREGORY, of the Firm of Gregory and Haynes, of Salford, in the County of**  
10 **Lancaster, Brewery Machinists, send greeting.**

**WHEREAS** Her most Excellent Majesty Queen Victoria, by Her Letters Patent, bearing date the Nineteenth day of March, in the year of our Lord One thousand eight hundred and sixty-seven, in the thirtieth year of Her reign, did, for Herself, Her heirs and successors, give and grant unto me, the said  
15 Francis Gregory, Her special license that I, the said Francis Gregory, my executors, administrators, and assigns, or such others as I, the said Francis Gregory, my executors, administrators, and assigns, should at any time agree with, and no others, from time to time and at all times thereafter during the term therein expressed, should and lawfully might make, use, exercise, and  
20 vend, within the United Kingdom of Great Britain and Ireland, the Channel Islands, and Isle of Man, an Invention for "**IMPROVEMENTS IN MACHINERY OR APPARATUS USED IN BREWERIES AND DISTILLERIES,**" upon the condition (amongst others) that I, the said Francis Gregory, my executors or administrators, by an instrument in writing under my, or their, or one of their hands  
25 and seals, should particularly describe and ascertain the nature of the said Invention, and in what manner the same was to be performed, and cause the same to be filed in the Great Seal Patent Office within six calendar months next and immediately after the date of the said Letters Patent.

30 **NOW KNOW YE,** that I, the said Francis Gregory, do hereby declare the nature of my said Invention, and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement (that is to say):—

This Invention consists in improved machinery or apparatus for cooling or



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*Gregory's Improvements in Refrigerating Apparatus.*

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regulating the temperature of the wort liquors in the process of brewing, or for other similar purposes.

The manner in which my Invention is to be performed will be clearly understood by the following particular description thereof, reference being had to the Figures on the accompanying Sheet of Drawings, and to the 5 letters of reference marked thereon.

Figs. 1 and 2 are longitudinal and transverse sections, and Fig. 3 a plan of one arrangement of my improved machinery or apparatus; Figs. 4 and 5 are longitudinal and transverse sections, and Fig. 6 a plan of one modification; and Figs. 7 and 8 are end and side views of another modification of the 10 same.

I employ a series of hollow troughs *a* framed or formed of corrugated metal in the shape of continuous external and internal arches of the same or of different spans with suitable ends, which series of troughs I place in a framework vessel or cistern *b* of the required shape and dimensions, to which 15 I attach by hinges *c* or otherwise another framework *d* which supports a number of pipes or tubes *e* of any required shape or configuration with suitable connections, so that the pipes or tubes fit into the hollow troughs of the corrugated metal, allowing a space between the concavities of the said corrugated troughs. At one side or end of the framework or vessel I place 20 a channel or trough *f* communicating by cocks *g* with the ends of the corrugated troughs for draining the troughs when required; or at the ends of the openings in the trough or channel I place a number of valves attached to a shaft, and provide each valve with a spring, the arrangement being such that all can be opened and shut by one operation. In the tubes or pipes *e* I 25 place one or more smaller pipes or tubes *h* of any required configuration with one or both ends entirely or partially closed for the purpose of limiting the passage of the water or other liquid, so that in passing a given quantity through it must flow with a greater velocity than with the full bore of the pipe; or timber or any solid or hollow material may be used for the same purpose. 30 The wort from the hop beck or cooler is admitted by the pipe *i*, Fig. 3, into the corrugated troughs *a*, the wort being directed by strips or projections *j* on the pipes *e* underneath the said pipes *e* in a broad thin sheet, sufficient inclination being given to the apparatus to cause the wort to flow and pass over the convex arch of the first corrugated trough and underneath the next pipe, and 35 so on to the other side of the refrigerator, where it passes into the last concave space *k*, and from thence conveyed where required by the pipe *l*, the corrugated troughs being drained by the taps *g* and trough *f*. Water or other liquid is



*Gregory's Improvements in Refrigerating Apparatus.*

admitted by the pipe *m* passing into the first pipe *e*, and thence conveyed by the first connection *n* to the next pipe, and so on through the other connections *n* and pipes *e* to the other end, where it passes out through the outlet pipe *o*. I admit water or other liquid by the pipe *p* into the vessel or cistern *b* underneath the corrugated troughs *a*, the passage of the liquid being directed by the partitions *q* so that it follows the course of the corrugated troughs in a thin stream until it passes out through the outlet pipe *r*, and the stream of water may be used either separately or conjointly. The connections *n* to which the pipes *e* are fixed are secured to the hinged frame *d*, to which is  
10 attached a rod *s* connected by a chain *t* to a winch or other lifting apparatus, so that all the pipes can be lifted out of their respective troughs to facilitate their being cleaned; or I employ the plans described by me in the Specification of the Letters Patent bearing date the Twenty-ninth day of April, in the year of our Lord One thousand eight hundred and sixty-five, No. 1204.

15 In Figs. 4, 5, and 6, instead of the connections *n* which hold the tubes or pipes *e* passing over the exterior or convex arches of the corrugated troughs, as shewn in Fig. 3, a part of the convex arch at each alternate end is removed, so that the connection is carried in a straight line from the end of one pipe to the next, as shewn in the said Figs. 4, 5, and 6, thus dispensing with the  
20 valves or taps for draining.

In Figs. 7 and 8, representing another modification of my improvements, I place two or more pipes *e* in each corrugated trough or space *a*, either round, as shewn in the Figures, or of any other shape or configuration. I sometimes pass the hot worts through the pipes or tubes *e* instead of the  
25 plan described, in which case the water or liquid must pass over the surfaces of the corrugated troughs, and when desired I dispense with the interior tubes or other material in the interiors of the pipes *e*. It is evident that the various modifications of this apparatus can be used for distilleries as well as breweries.

30 Having now described the nature and particulars of the said Invention, and the manner in which the same is to be performed, I desire it to be understood that I claim,—

First, the employment of two streams of water or other liquid in the manner described for cooling the wort.

35 Secondly, the employment of an interior tube or tubes of any configuration or pieces of hollow or solid material to diminish the area of the exterior pipes or tubes *e*.

And, thirdly, the employment of the aforesaid parts of my Invention, either



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*Gregory's Improvements in Refrigerating Apparatus.*

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separately or conjoined, or any mere modification thereof, such as substituting flat or oval pipes or tubes instead of round ones.

In witness whereof, I, the said Francis Gregory, have hereunto set my hand and seal, this Seventeenth day of September, in the year of our Lord One thousand eight hundred and sixty-seven. 5

FRANCIS GREGORY. (L.S.)

Signed, sealed, and delivered by the within-named Francis Gregory, in the presence of

G. SEPTIMUS HUGHES,  
Patent Agent,  
Manchester.

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Printed by GEORGE EDWARD EYRE and WILLIAM SPOTTISWOODE,  
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